## RESEARCH



# Relation among hope, self-efficacy, and psychological distress in hemodialysis patients: a path analysis



Elaheh Shourabi<sup>1</sup> and Seyyed Abolfazl Vagharseyyedin<sup>2\*</sup>

### Abstract

**Background** Psychological distress is a major problem among hemodialysis patients. Certain prior studies suggest that psychological distress is negatively associated with hope and self-efficacy. The way hope and self-efficacy are linked with psychological distress, as well as the strength of these correlations in hemodialysis patients, may vary across cultures. Also, it is unclear whether self-efficacy mediates the relationship between hope and psychological distress. The purpose of this study was to look into the effects of hope, self-efficacy, and demographic characteristics on psychological distress, as well as to verify the mediating role of self-efficacy in the relationship between hope and psychological distress in a sample of Iranian hemodialysis patients.

**Methods** This cross-sectional descriptive-analytical study was conducted in 2022. Total population sampling was used. The data collection tools were distributed to 345 eligible hemodialysis patients from six dialysis centers in Southern Khorasan province, Iran. Among them, 215 patients completed the questionnaires. Data were collected using a demographic questionnaire, the Chronic Kidney Disease Self-Efficacy instrument, the Kessler Psychological Distress Scale, and the Herth Hope Index. Data were analyzed using SPSS version 24 and AMOS version 22.

**Results** The final predictors of psychological distress were hope ( $\beta = -0.44$ , P < 0.001), self-efficacy ( $\beta = -0.29$ , P < 0.001), and duration of hemodialysis ( $\beta = -0.15$ , P = 0.003). These variables collectively predicted 46% of the variance of psychological distress. Path analysis with good model fit indices indicated the significant direct effect of hope on psychological distress ( $\beta = -0.47$ , P < 0.001), the significant direct effect of self-efficacy on psychological distress ( $\beta = -0.29$ , P < 0.001), the significant direct effect of hope on self-efficacy ( $\beta = 0.49$ , P < 0.001), and the significant indirect effect of hope on psychological distress ( $\beta = -0.29$ , P < 0.001), the significant direct effect of self-efficacy ( $\beta = 0.49$ , P < 0.001), and the significant indirect effect of hope on psychological distress ( $\beta = -0.19$ , [95% CI = -0.32, -0.08], P < 0.001).

**Conclusion** It is crucial to consider hope, self-efficacy, and the duration of hemodialysis when designing interventions aimed at reducing psychological distress in hemodialysis patients. According to this study, hope has a significant influence on reducing psychological distress by enhancing self-efficacy. Therefore, implementing programs that improve hope and self-efficacy simultaneously may reduce psychological distress in hemodialysis patients.

Keywords Hemodialysis patients, Hope, Psychological distress, Self-efficacy

\*Correspondence: Seyyed Abolfazl Vagharseyyedin Waghars@bums.ac.ir <sup>1</sup>Department of Nursing, Faculty of Nursing and Midwifery, Birjand University of Medical Sciences, Birjand University of Medical Sciences, Ghaffari Avenue, Birjand, Southern Khorasan, Birjand 97175-379, Iran <sup>2</sup>Department of Nursing, Faculty of Nursing and Midwifery, Birjand University of Medical Sciences, Birjand, Iran



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#### Background

Progressive in nature, chronic kidney disease (CKD) represents a significant public health concern worldwide [1]. In 2017, the global population of people with CKD was estimated to be approximately 843.6 million [2]. A study in Iran also showed that 16.6% of adults in urban areas suffer from CKD [3]. In 2017, the global death from CKD was 1.2 million [1].

Poor management of CKD can result in the development of end-stage kidney disease (ESKD), where kidney function deteriorates irreversibly. The routine treatments of ESKD are hemodialysis, peritoneal dialysis, and kidney transplantation. Hemodialysis is the most prevalent ESKD treatment throughout the world [4]. ESKD and hemodialysis are associated with many different negative consequences, including impaired quality of life, increased healthcare costs, and premature death [5, 6]. Therefore, to reduce the negative consequences caused by hemodialysis, it is necessary to investigate the factors affecting these consequences.

The physical, mental, and financial repercussions of ESKD can result in a variety of psychological complications, including anxiety, depression, and stress [7]. The prevalence of depression among hemodialysis patients is three to four times more than patients who do not undergo hemodialysis [8]. Moreover, the prevalence of anxiety among hemodialysis patients is 45%, while the prevalence of anxiety among the general public during the 2019 coronavirus disease pandemic was 9.31% [9, 10]. The high prevalence of psychological problems among patients with CKD can lead to psychological distress (PD), which is a state of emotional suffering due to the inability to cope with daily stressors. The common symptoms of PD are depression and anxiety [11]. A study notes that 75% of patients with CKD suffer from PD [12]. PD has different negative consequences, such as increased risk for hospitalization, increased mortality rate, reduced social interactions, and impaired quality of life [12, 13].

Many different factors can protect patients against PD. One of these factors is hope, which is defined as one's perceived ability to achieve goals and improve motivation [13]. A recent review article concludes that hope therapy can increase hemodialysis patients' happiness while decreasing tension, anxiety, and depression [14]. Over the past few decades, there has been an increasing body of research about hope and culture. Recent research has focused more broadly on how hope operates in diverse contexts and ethnicities. Paradoxically, some recent research suggests that higher levels of hope can be associated with less well-being across cultural groups [15].

Self-efficacy (SE) is another factor with potential protective effects against PD. SE refers to patients' trust in their ability to adhere to treatments and manage their diseases [6]. Higher SE in hemodialysis patients is associated with higher levels of psychological well-being [16]. Some studies indicate a significant negative relationship between SE and depression as a symptom of PD [17]. Previous research has linked perceived SE to cultural and social contexts, including social capital [18]. This assertion is supported by a study conducted in Iran in which, surprisingly, SE did not mediate occupational stress and mental health among nursing professionals [19]. Likewise, Shahrbabaki et al. (2023) did not find a significant association between the mental dimension of COVID-19 anxiety and SE among Iranian patients undergoing hemodialysis [20].

SE is a construct distinguishable from hope. Hope is considered a relatively stable, cross-situational predisposition, while SE is a specific characteristic of a particular individual's abilities in particular circumstances. Unlike hope, SE is not regarded as a personality trait and is not characterized as an outcome expectation [21, 22].

Given this context, it stands to reason that hope and SE are two characteristics that are culturally constructed and evaluated. Consequently, their association with PD and the strength of these correlations in hemodialysis patients may vary across cultural and national boundaries. Additionally, whether SE has a mediating effect between hope and PD is still unclear.

#### Methods

#### The aim, design, and setting of the study

The objectives of this study were twofold: [1] to investigate the influence of hope, SE, and demographic characteristics on the PD of hemodialysis patients (Fig. 1) and (2) to verify the mediating effect of SE between hope and PD. The following hypotheses were proposed for this purpose: Hypothesis 1 states that hope has a significant direct impact on PD. In hypothesis 2, we expect that hope has a significant indirect impact on PD through SE, which mediates the relationship between hope and PD. Figure 2 presents the framework for these hypotheses.

In relation to the second objective of this study, which is to examine the mediating effect of SE between hope and PD, we identified a path from hope to PD, where SE was a mediator.

In this study conducted in 2022, a cross-sectional descriptive-analytical design was used. The study was conducted in six dialysis centers located in the Southern Khorasan province of Iran. These centers share similarities with respect to their equipment, facilities, and care provision. The study population consisted of all patients who were referred to the study setting to receive hemodialysis.

The characteristics of participants and data collection tools Total population sampling was used to gather the data. Following authorization from the relevant authorities,





Fig. 2 Study's conceptual framework (2nd objective)

the primary author (ESh) personally approached eligible participants on their hemodialysis day. Age over eighteen, absence of overt psychological disorders (e.g., depression), lack of hearing or speech impairments, capacity to respond to the study tools, absence of physical disability, and a minimum six-month hemodialysis history constituted the inclusion criteria. The data collection tools were distributed to 345 patients who satisfied the inclusion criteria and expressed their willingness to take part in the study. Out of the total, 230 patients completed the data collection tools. The incomplete responses of fifteen participants were omitted from the analyses. As a result, 215 patients were included in the final analysis.

In path analysis, the need for larger sample sizes arises when dealing with more intricate models involving a greater number of parameters or when working with tools that have a relatively low level of reliability [23]. This study utilized three parameters, and the data collection tools demonstrated a relatively high level of reliability. In structural equation modeling, previous research has commonly recommended a minimum sample size of 10 to 20 participants per parameter in order to obtain reliable and unbiased estimates [24]. Therefore, a sample size of 215 participants in the present study appears to be sufficient.

Tools included a demographics form, the Kessler Psychological Distress Scale, the Chronic Kidney Disease Self-efficacy (CKD-SE) instrument, and the Herth Hope Index. The items of the demographic questionnaire covered age, gender, number of children, marital status, educational level, and history of hemodialysis.

The kessler psychological distress scale has six items on nervousness, restlessness, hopelessness, depression, difficulty of life, and worthlessness in the past month. Items are scored on a five-point scale from zero ("Never") to 4 ("Always"). The possible total score on the scale is 0-24, with higher scores showing higher PD [25]. We used the Persian version of this scale, which had acceptable validity and reliability, as reported in a previous study [26]. The Cronbach's alpha of the scale in the present study was 0.90.

The CKD-SE instrument consists of 25 items divided into five subscales: autonomy, self-integration, problem solving, and seeking social support. Items are scored on a 1-10 scale. The possible total score of the instrument is 25-250, and higher scores mean higher SE. A study reported that the Cronbach's alpha of the instrument was 0.941 [6]. Requisite authorizations for applying this tool in the current research were acquired from its designers. Following Brislin's translation model [27], the tool was translated into Persian using the forward-backward technique. In order to accomplish this task, two translators who were proficient in both English and Persian were contracted to translate the CKD-SE into Persian. Subsequently, the research team and the two translators evaluated the level of clarity and identified any minor inconsistencies between the translated versions. Subsequently, the original Persian version of the tool was rendered into English by an accredited translator who did not have access to the initial English copy. The research team compared the aforementioned version and the original version. They confirmed that there were no noticeable variations in meaning between the two. Subsequently, 11 faculties from the Faculty of Nursing and Midwifery in Birjand, Iran, verified the content validity of the study with item content validity indices ranging from 0.81 to 1. In the current study, Cronbach's alpha coefficients for the total instrument was 0.9.

The herth hope index is an index with twelve items scored on a four-point scale from 1 ("Completely disagree") to 4 ("Completely agree"). The possible total score of the index is 12–48, with higher scores standing for greater hope. This scale has been used in hemodialysis patients in Iran and has shown acceptable validity and reliability [27, 28]. Its Cronbach's alpha coefficient was 0.78 in the current study.

#### Statistical analysis

SPSS software, version 24.0, was used for data analysis. Analyses were conducted after the missing data were substituted using the mean of nearby points' method.

The data were analyzed using descriptive statistics, including measures such as frequency, mean, and standard deviation. Statistical comparisons were conducted to analyze the differences in participants' demographic characteristics. The Kruskal-Wallis and Mann-Whitney tests were used, along with post hoc pairwise Mann-Whitney tests that included a Bonferroni correction. Correlation analysis was conducted using either Pearson's or Spearman's correlation analysis. The predictors of PE were identified using multiple linear regression with the stepwise method. Variables that had a significance level below 0.1 in the univariate model were included in the multiple regression model. According to this criterion, the potential candidates for the multiple regression model included gender, educational level, duration of hemodialysis, hope, and SE.

Path analysis was conducted using Amos software, version 22.0, specifically to assess the indirect impact of hope on PD. The following indices were used to assess the path analysis model's goodness of fit: Tucker-Lewis Index (TLI), comparative fit index (CFI), chi-square divided by degrees of freedom ( $\chi$ 2/df), and the root mean score error of approximation (RMSEA). The model's goodness of fit was confirmed as per the insignificant results of a CFI  $\geq$  0.95, a  $\chi$ 2/df  $\leq$  5, an RMSEA  $\leq$  0.60, and a TLI  $\geq$  0.95 [29]. This study employed the maximum likelihood method to estimate the structural equations. Additionally, the bootstrapping technique was used to examine the indirect impact of hope on PD.

#### Results

#### Demographic characteristics of the participants

Participants were 215 hemodialysis patients with a mean age of  $45.69 \pm 16.1$  years and a mean hemodialysis history of  $2.06 \pm 2.58$  years in the range of 0.5-20 years. Most of them were female (53%), housewives (53%), and married (68.8%) (Table 1).

#### Mean scores of hope, SE, and PD and predictors of PD

The mean scores of hope, PD, and SE were 25.83 ± 4.82, 14.8±6.55, and 170.09±38.75, respectively. A significantly positive correlation was found between PD and duration of hemodialysis (r = -0.3, P < 0.001). As illustrated in Table 1, men reported significantly lower PD (P=0.032) and higher SE (P=0.037) than women. Also, retired participants had higher hope levels than selfemployed participants (P=0.013). According to statistical analysis, participants with a bachelor's degree or above had higher hope and SE and lower PD than those with lower education (P < 0.05). Correlation analysis revealed a significant direct correlation between hope and SE (r = 0.42, P < 0.001), a significant inverse correlation between hope and PD (r = -0.66, P < 0.001), and a significant inverse correlation between SE and PD (r =-0.45, P < 0.001). The results of the multiple linear regression analysis revealed that the final significant predictors of PD were hope ( $\beta$  = -0.44, *P*<0.001), SE ( $\beta$  = -0.29, P < 0.001), and duration of hemodialysis ( $\beta = -0.15$ , P = 0.003). These variables collectively predicted 46% of the variance of PD (Table 2).

#### Path model

The path analysis results showed a significant positive and direct impact of hope on PD ( $\beta = -0.47$ , P < 0.001), a significant positive and direct impact of hope on SE ( $\beta = 0.49$ , P < 0.001), and a significant negative and direct impact of SE on PD ( $\beta = -0.29$ , P < 0.001). In addition,

| Table 1 | The mean scores of | <sup>f</sup> participants' hop | e, PD, and SE | and their relationsh | ips with demogra | aphic characteristics |
|---------|--------------------|--------------------------------|---------------|----------------------|------------------|-----------------------|
|         |                    |                                |               |                      |                  |                       |

| Characteristics   |                               | n (%)       | Норе             | <b>P</b> value | SE                 | <i>P</i> value | PD               | <i>P</i> value            |
|-------------------|-------------------------------|-------------|------------------|----------------|--------------------|----------------|------------------|---------------------------|
| Gender            | Male                          | 101 (47.00) | 26.17±5.39       | 0.535^         | 175.73±37.45       | 0.037^         | 13.71±6.60       | <b>0.032</b> <sup>^</sup> |
|                   | Female                        | 114 (53.00) | $25.53 \pm 4.27$ |                | $165.09 \pm 39.39$ |                | $15.78 \pm 6.38$ |                           |
| Occupation        | Employee                      | 14 (6.50)   | $28.50 \pm 7.10$ | 0.044^^^       | 188.78±43.42       | 0.056^^        | 13.35±6.59       | 0.163^^                   |
|                   | Housewife                     | 114 (53.00) | $25.64 \pm 4.29$ |                | $39.72 \pm 3.72$   |                | $15.63 \pm 6.42$ |                           |
|                   | Self-employed                 | 52 (24.20)  | $25.17 \pm 5.66$ |                | $171.03 \pm 38.08$ |                | $14.73 \pm 6.37$ |                           |
|                   | Retired                       | 35 (16.30)  | $26.37 \pm 3.74$ |                | 175.77±32.79       |                | $12.82 \pm 6.98$ |                           |
| Marital status    | Single                        | 50 (23.30)  | $25.86 \pm 5.02$ | 0.687^^        | $167.52 \pm 35.03$ | 0.098^^        | $14.54 \pm 6.91$ | 0.941^^                   |
|                   | Married                       | 148 (68.80) | $25.93 \pm 4.93$ |                | $172.16 \pm 40.37$ |                | $14.83 \pm 6.66$ |                           |
|                   | Widowed                       | 17 (7.90)   | $24.88 \pm 3.14$ |                | 159.64±34.58       |                | $15.41 \pm 4.45$ |                           |
| Educational level | Below diploma                 | 111(51.60)  | $25.55 \pm 4.02$ | 0.008^^^       | $161.85 \pm 39.58$ | < 0.001        | $15.09 \pm 6.38$ | 0.016^^                   |
|                   | Diploma and associate diploma | 82(38.10)   | $25.24 \pm 5.00$ |                | $174.63 \pm 37.08$ |                | $15.35 \pm 6.78$ |                           |
|                   | Bachelor's and higher         | 22(10.20)   | $29.45 \pm 6.36$ |                | 194.72±27.10       |                | $11.31 \pm 5.75$ |                           |

^^: Analyzed by the Kruskal-Wallis test

^: Analyzed by the Mann-Whitney test

Table 2 The results of the multiple linear regression analysis to determine the predictors of PD

| В     | Standard error                               | β  | t   | <i>P</i> value   |
|-------|--|--|---|--|
| 39.71 | 1.92   |  | 20.68   | < 0.001  |
| -0.60 | 0.08   | -0.44  | -7.56   | < 0.001  |
| -0.05 | 0.01   | -0.29  | -5.12   | < 0.001  |
| -0.03 | 0.02   | -0.15  | -3.02   | 0.003  |
|       | <b>B</b><br>39.71<br>-0.60<br>-0.05<br>-0.03 | B Standard error   39.71 1.92   -0.60 0.08   -0.05 0.01   -0.03 0.02 | BStandard errorβ39.711.92-0.600.08-0.44-0.050.01-0.29-0.030.02-0.15 | B Standard error β t   39.71 1.92 20.68   -0.60 0.08 -0.44 -7.56   -0.05 0.01 -0.29 -5.12   -0.03 0.02 -0.15 -3.02 |

 $R^2 = 0.47$ ; Adjusted  $R^2 = 0.46$ ; F = 60.90; P < 0.001



Fig. 3 The final path analysis model

the model demonstrated a significant indirect impact of hope on PD ( $\beta = -0.19$ , [95% CI = -0.32, -0.08], P < 0.001). The final model showed that hope explained 44% of the variance of PD with the significant mediating role of SE (Fig. 3). Model fit indices also confirmed the good fit of the path analysis model ( $\chi$ 2/df=3.95, P=0.06; RMSEA = 0.000 with a 95% CI of 0.000–0.007; CFI=1.0; and TLI = 0.99).

#### Discussion

This study aimed to investigate the influence of hope, SE, and demographic characteristics on PD and to verify the mediating effect of SE between hope and PD in a sample of Iranian hemodialysis patients.

Associations among hope, SE, and PD and predictors of PD In line with previous research [30, 31], this study shows a significant direct association between hope and SE. While SE and hope are distinguishably distinct constructs [22], they appear to be closely connected to the core of expectancies, as they are both cognitive sets that pertain to individual goals and future outlooks and influence positive behaviors [32].

The current study also found a significant inverse correlation between hope and PD, which is consistent with some previous studies [14, 33]. Hope encompasses various elements such as thinking power, determination, and strategic thinking to achieve a desired outcome. It can alleviate negative emotions such as doubt and uncertainty [34, 35]. According to this finding, it seems that increasing the hope levels in hemodialysis patients can reduce their PD.

In our study, we observed a significant inverse correlation between SE and PD, which aligns with findings from previous studies [17, 36]. Researchers believe that SE contributes significantly to obtaining better psychosocial adaptation [37]. Therefore, examining the SE levels of individuals with chronic illnesses and striving to enhance their SE could potentially lead to improved mental health outcomes. In contrast, a study found no significant link between the level of COVID-19 anxiety and the SE of hemodialysis patients [20]. Thus, one can assume that chronic conditions' complex and different nature may influence the patients' SE.

Regarding predictors of PD in participants of this study, we found that hope, SE, and duration of hemodialysis significantly predicted 46% of the variance of PD. Based on this finding, integrating strategies to improve hope and SE into PD management protocols can improve the effectiveness of these protocols. Future studies can be directed to explore other potential factors influencing PD in hemodialysis patients.

#### Path model

#### Hypothesis 1: hope has a significant direct impact on PD

Considering the second objective in this study, i.e., verifying the mediating effect of SE between hope and PD, we identified one path from hope to PD mediated by SE. The study findings also revealed the significant and negative direct effects of hope on PD. Therefore, the first path of hypothesized path analysis (the first hypothesis) was supported. In line with this finding, a study showed that hope had a significant inverse relationship with the common symptoms of PD, including depression, anxiety, and stress [38]. Another study reported that hope therapy can reduce depression, anxiety, and stress among hemodialysis patients [39]. Greater hope helps individuals cope with stressors more effectively and reduces the risk of psychological problems such as anxiety [40]. Patients with chronic diseases have different physiological, emotional, and psychological needs, which should be considered in the process of treatment. Hope therapy, for example, is a strategy that emphasizes these needs and, thereby, can improve mental health [41, 42].

# Hypothesis 2: SE mediates the relationship between hope and PD

In order to verify this hypothesis, the path from hope to SE was examined. Statistical analysis revealed a significant positive and direct impact of hope on SE was found. In line with this finding, a study found that hope had a significant direct effect on SE in CKD patients [43]. Previous research suggests that hope and SE are interrelated yet distinct concepts that positively affect health-related outcomes through different paths [32]. As a beneficial internal force, hope is a crucial strategy for patients to manage illness. Available evidence indicates that an adequate depth of hope can activate SE in people [44]. As a result, they strongly believe in achieving a specific behavioral goal, which encourages patients to seek information and cooperate with others to take positive steps and cope with the disease [45, 46]. Also, a significant inverse relationship between SE and PD was found. Consistent with this finding, a prior investigation demonstrated that SE exhibited a significant negative correlation with depression as a manifestation of PD, and depression decreased the likelihood of having high SE [17]. Social cognitive theory can assist in explaining the negative correlation between SE and PD. This theory posits that a low level of SE can result in feelings of depression due to a mismatch between one's expectations and perceived capabilities [47].

Finally, the path analysis showed that hope has a significant indirect impact on PD through SE. In other words, the second hypothesis of the proposed path analysis was also supported. Put simply, hope appears to decrease PD in hemodialysis patients by improving both their SE directly and indirectly.

#### Mean scores of the main study variables

The mean score of hope in the present study was  $25.83 \pm 4.82$  (in the possible range of 12-48). A previous study has reported a greater average score of hope among hemodialysis patients [29]. This difference can be attributable to the variations between these two studies concerning the duration of hemodialysis, which was 5.4 years in the above study and around two years in the present study. Patients with longer hemodialysis histories have more hemodialysis-related experiences, better cope with associated problems, and, hence, may have greater hope [38]. Furthermore, one can assume that hope can be a context-bound issue. Yet, this assertion needs to be further studied.

The total mean score of SE in the present study was  $170.09 \pm 38.75$  (in the possible range of 25-250). This mean score in a study on hemodialysis patients in Saudi Arabia was  $192.57 \pm 39.23$  [4], which is greater than in our study. This difference may be due to the higher educational level of participants in that study [3]. Patients with higher educational levels have greater knowledge and feel higher SE [5].

Our findings also revealed that the mean score of PD was  $14.8 \pm 6.55$  (in the possible range of 0–24), denoting high PD. However, the mean score of PD in two studies on hemodialysis patients was low [48, 49]. This difference is attributable to the greater number of men in those two studies and the greater number of women in our study. Generally, female hemodialysis patients experience greater stress than their male counterparts [50], probably due to their multiple familial and occupational roles and their female sex hormones [51].

We also observed that hope had a significant positive direct effect on SE. Our research revealed that hope directly influenced PD. Moreover, it indirectly influenced PD through its impact on SE.

#### Implications and limitations of the study

Hemodialysis patients' mental health is extremely important. It is logical for healthcare providers to proactively take steps to prevent PD rather than waiting for this problem to manifest. The results of this study indicate that including hope and SE concurrently in programs designed to decrease PD among hemodialysis patients can be advantageous. Constantly monitoring SE and hope and subsequently implementing socioculturally tailored strategies to enhance patients' PD is beneficial. Policymakers and hospital administrators must provide the necessary attention and support to ensure the success of such efforts. Incorporating psychological counseling into care programs for patients with elevated levels of PD, or those susceptible to it, can enhance interprofessional collaboration among healthcare practitioners, thereby augmenting the likelihood of identifying an optimal solution.

#### Limitations

It is notable that this study was a cross-sectional one. Therefore, causal associations between the variables could not be established. It is advisable for future research to employ longitudinal designs in order to yield more reliable data regarding the impacts of hope and SE on PD. Also, the use of self-reported data in this study raises concerns about potential self-reporting bias. For instance, social desirability may have influenced participants' responses to the data collection tool.

#### Conclusion

It is important to consider hope, SE, and the length of hemodialysis when designing interventions that target PD among hemodialysis patients. In this study, hope has a significant influence on reducing PD by enhancing SE. Therefore, implementing programs that improve hope and SE simultaneously may reduce PD in hemodialysis patients.

#### Abbreviations

PD Psychological distress SE Self-efficacy

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#### Author contributions

"Study design: SAV and ESh; data collection: SAV and ESh; analysis and statistics: SAV; and manuscript preparation: SAV and ESh. Authors approved the final version for submission".

#### Funding

This was an unfunded study.

#### Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

#### Declarations

#### Ethics approval and consent to participate

The current study was conducted in accordance with the Declaration of Helsinki. The Ethics Committee of Birjand University of Medical Sciences approved this study with the code of ethics IR.BUMS.REC.1400.214. Informed consent to participate was obtained from all the participants, and an assurance was provided regarding the confidentiality of their data.

#### **Consent for publication**

Not applicable.

#### Competing interests

The authors declare no competing interests.

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